CRITERION 728

DRY CHEMICAL EXTINGUISHING SYSTEMS

SIGNATURES

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RECORD OF REVISIONS

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DRY CHEMICAL EXTINGUISHING SYSTEMS

1.0 PURPOSE

The purpose of this Criterion is to establish the minimum requirements and best practices for operation and maintenance of dry chemical extinguishing systems at LANL.

This document addresses the requirements of LIR 230-05-01(Ref 10.1), "Operations and Maintenance Manual."

Implementation of this Criterion satisfies DOE Order 430.1A (Ref 10.2) for the subject equipment/system. DOE Order 430.1A (Ref 10.2) "Life Cycle Asset Management," Attachment 2 "Contractor Requirements Document," Paragraph 2, Sections A through C, which in part requires UC to "…maintain physical assets in a condition suitable for their intended purpose," and employ "preventive, predictive, and corrective maintenance to ensure physical asset availability for planned use and/or proper disposition." Compliance with DOE Order 430.1A is required by Appendix G of the UC Contract.

2.0 SCOPE

The scope of this Criterion includes the routine inspection, testing and preventive and predictive maintenance of dry chemical extinguishing systems. This Criterion does not address corrective maintenance actions required to repair or replace equipment.

Dry chemical extinguishing systems currently installed at LANL facilities are restricted to systems at cooking hoods at TA-3-261, TA-16-192, TA-55-3, and TA-53-1. If a different type of dry chemical extinguishing system is installed at a LANL facility (other than a cooking hood system), this Criterion must be modified to reflect additional ITM requirements.

3.0 ACRONYMS AND DEFINITIONS

3.1 Acronyms

AHJ	Authority Having Jurisdiction
CFR	Code of Federal Regulations

DOE	Department of Energy
ITM	Inspections, Testing, and Maintenance
LIR	Laboratory Implementing Requirement
LPR	Laboratory Performance Requirement
O&M	Operations and Maintenance
PP&PE	Personal Property and Programmatic Equipment
RP&IE	Real Property and Installed Equipment
SSC	Structures, Systems, and Components
SSS	Support Services Subcontractors
UC	University of California

3.2 Definitions

Dry Chemical. A powder composed of very small particles, usually sodium bicarbonate-, potassium bicarbonate-, or ammonium phosphate-based with added particulate material supplemented by special treatment to provide resistance to packing, resistance to moisture absorption (caking), and the proper flow capabilities.

Hydrostatic Testing. Pressure testing of a pressure boundary (tank, piping, etc.) to verify its strength against unwanted rupture.

Management Level Determination (ML1, ML2, ML3, ML4). A classification system for determining the degree of management control applied to facility work. See LIR 230-01-02 for definitions of each ML level.

4.0 RESPONSIBILITIES

4.1 FWO-Systems, Engineering and Maintenance (SEM)

4.1.1 FWO-SEM is responsible for the administrative content of this Criterion and monitoring the applicability and the implementation status of this Criteria and either assisting the organizations that are not applying or meeting the implementation expectations contained herein or elevating their concerns to the director(s).

Basis: LIR 301-00-01.11; Issuing and Managing Laboratory Operations Implementation Requirements and Guidance, Section 5.4, OIC Implementation Requirements.

4.1.2 FWO-SEM shall provide technical assistance to support implementation of this Criterion.

4.2 FWO-Fire Protection (FWO-FIRE)

4.2.1 FWO-FIRE is responsible for the technical content of this Criterion and assessing the proper implementation across the Laboratory.

4.2.2 FWO-FIRE shall provide technical assistance to support implementation of this Criterion.

4.3 Facility Manager

4.3.1 Responsible for operations and maintenance of institutional, or Real Property and Installed Equipment (RP&IE) under their jurisdiction, in accordance with the requirements of this document.

4.3.2 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document that may be assigned to the FM in accordance with the FMU-specific Facility/Tenant Agreement.

4.4 Group Leader

4.4.1 Responsible for operations and maintenance of those Personal Property and Programmatic Equipment (PP&PE) systems and equipment addressed by this document, which are under their jurisdiction.

4.4.2 Responsible for system performance analysis and subsequent replacement or refurbishment of assigned PP&PE.

4.5 Authority Having Jurisdiction (AHJ) – Fire Marshal

4.5.1 The AHJ is responsible for providing a decision on specific technical questions regarding this criterion.

4.5.2 The LANL Fire Marshal is the approval authority for all exceptions and variances to this Criterion.

4.6 Support Services Subcontractor (SSS)

4.6.1 Responsible for providing ITM of the fire protection systems addressed in this Criterion at the request of the responsible Facility Manager.

4.6.2 Responsible for coordinating work with the operating group and Facility Manager to conduct ITM in the affected area.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 Precautions

This section is not intended to identify all applicable precautions necessary for implementation of this Criterion. A compilation of all applicable precautions shall be contained in the implementing procedure(s) or work control authorization documents. The following precautions are intended only to

assist the author of a procedure or work control document in the identification of hazards/precautions that may not be immediately obvious.

5.2 Limitations

The intent of this Criterion is to identify the minimum generic requirements and recommendations for SSC operation and maintenance across the Laboratory. Each user is responsible for the identification and implementation of additional facility specific requirements and recommendations based on their authorization basis and unique equipment and conditions, (e.g., equipment history, manufacturer warranties, operating environment, vendor O&M requirements and guidance, etc.).

Nuclear facilities and moderate to high hazard non-nuclear facilities will typically have additional facility-specific requirements beyond those presented in this Criterion. Nuclear facilities shall implement the requirements of DOE Order 4330.4B (Ref. 10.3) as the minimum programmatic requirements for a maintenance program. Additional requirements and recommendations for SSC operation and maintenance may be necessary to fully comply with the current DOE Order or CFR identified above.

6.0 REQUIREMENTS

Minimum requirements that Criterion users shall follow are specified in this section. Requested variances and exceptions to these requirements shall be prepared and submitted to FWO-SEM in accordance with LIR 301-00-02 (Ref. 10.4), "Variances and Exceptions to Laboratory Operations Requirements," for review and approval. The Criterion users are responsible for analysis of operational performance and SSC replacement or refurbishment based on this analysis. Laws, codes, contractual requirements, engineering judgement, safety matters, and operations and maintenance experience drive the requirements contained in this section. The LANL Fire Marshal is the approval authority for all variances and exceptions to this Criterion.

6.1 Operations Requirements

6.1.1 Operational Checklist

Dry chemical extinguishing systems must remain in service at all times. A dry chemical extinguishing system shall be deemed operational when the following conditions are met:

- Dry chemical and expellent gas containers are in good condition, mounted properly, and are charged with the required quantity of extinguishing agent and expellent gas.
- Discharge nozzles are in good physical condition, unobstructed, and are aligned properly.

- Automatic and manual means of system actuation are in good working order.
- Equipment interlocks are operational.
- The systems piping, hoses, fittings, and hangers are in good repair.

Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.2 Inspection Requirements

6.2.1 Monthly Inspection

A monthly inspection shall be conducted in accordance with the manufacturer's listed installation and maintenance manual or owner's manual. At a minimum, the inspection shall include verification of the following:

- The extinguishing system is in its proper location.
- The manual actuators are unobstructed.
- The tamper indicators and seals are intact.
- The maintenance tag or certificate is in place.
- The system shows no physical damage or condition that might prevent operation (inspect all detectors, expellent gas containers, agent containers, releasing devices, piping, hose assemblies, nozzles, signals and auxiliary equipment).
- The pressure gauge(s), if provided, is in operable range.
- The nozzle blowoff caps, where provided, are intact and undamaged.
- Neither the protected equipment nor the hazard has been replaced, modified, or relocated.

Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-2.1. Compliance with this NFPA code is required per Appendix G of the UC contract

6.2.2 Semi-Annual Inspections (twice per year)

- Examine the dry chemical. If there is evidence of caking, the dry chemical shall be discarded and the system recharged in accordance with the manufacturer's instructions.

EXCEPTION: Dry chemical in stored pressure systems shall not require semiannual examination but shall be examined at least every six years.

- If the dry chemical agent is stored in a pressurized container, check the pressure. If the gauge indicates more than a 10% loss in pressure from that required, refill or replace the container.

  Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-3. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.3 Maintenance Requirements

6.3.1 Fusible Elements/Links

- Fixed temperature sensing elements of the fusible metal alloy type (ex. fusible links) shall be replaced at least annually from the date of installation. They shall be destroyed when removed.
- The year of manufacture and the date of installation of the fixed temperature-sensing element shall be marked on the system inspection tag. The tag shall be signed or initialed by the installer.

  Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-3. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.3.2 Other

- Where semiannual maintenance of any dry chemical containers or system components reveals conditions such as, but not limited to, corrosion or pitting in excess of the manufacturer's limits, structural damage or fire damage, or repairs by soldering, welding, or brazing, the affected part(s) shall be replaced or hydrostatically tested in accordance with the recommendations of the manufacturer or the listing agency.
- Where the maintenance of system(s) reveals defective parts that could cause an impairment or failure of proper operation of the system(s) the affected parts shall be replaced or repaired in accordance with the manufacturer's recommendations.
- Each dry chemical system shall have a tag or label indicating the month and year that maintenance was performed and identifying the person performing the work. Only the current tag or label shall remain in place.
- Dry chemical system shall be recharged after use or as indicated by inspection or maintenance check.

  Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-3. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.4 Testing Requirements

6.4.1 Semi-Annually (twice per year)

1. Conduct an operating test of each dry chemical extinguishing system. This involves an operational test all system components without discharging the dry chemical agent. (Fusible links shall not be tested, but shall be replaced annually.)
2. Verify that the agent distribution piping is not obstructed, by one of the following means:
   (a) Disassembly of all piping
   (b) Purging of piping with nitrogen or dry air
   (c) Conducting a full or partial discharge test
   (d) Utilizing methods recommended by the manufacturer

Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-3. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.4.2 Every 12 Years

Conduct a hydrostatic test on the following system equipment, at a test pressure equal to the marked factory test or as specified by the manufacturer:

- Dry chemical containers (test empty)
- Auxiliary pressure containers
- Valve assemblies
- Hoses assemblies

NOTE: All equipment passing the test must be thoroughly cleaned and dried prior to reinstallation/reuse.

Basis: NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems, Chapter 9-5. Compliance with this NFPA code is required per Appendix G of the UC contract.

6.5 Impairments and Modifications

If one or more of the operational requirements listed in Section 6.1.1 are not maintained, follow the actions outlined in Criterion 733, "Fire Protection System Impairment Control Program".

6.5.1 Inspection Following an Impairment or Modification

A visually inspection of the system shall be performed before returning it to service.

6.5.2 Testing Following Impairment or Modification

- An operational test of the system shall be performed before returning the system to service. This involves testing of all system components without discharging the dry chemical agent.
- If system piping has been breached, piping continuity shall be tested before returning the system to service. Use one of the methods listed in Section 6.4.1-2 of this Criterion.

7.0 RECOMMENDATIONS AND GOOD PRACTICES

The information provided in this section is recommended based on acceptable industry practices and should be implemented by each user based on his/her unique application and operating history of the subject systems/equipment.

7.1 Operations Recommendations

7.1.1 Persons other than SSS Fire Protection Maintenance personnel may conduct visual inspection requirements identified in this document.

7.2 Maintenance Recommendations

7.2.1 In order to maintain system components in good working order, it is recommended that those system components exposed to harsh conditions (cooking grease, heat, etc.) be cleaned at least annually.

8.0 GUIDANCE

8.1 Operations Guidance

8.1.1 Not applicable.

8.2 Maintenance Guidance

8.2.1 Not applicable.

9.0 REQUIRED DOCUMENTATION

Maintenance history shall be maintained for dry chemical extinguishing systems to include, as a minimum, the parameters listed in the Table 9-1 below:

Table 9-1 Documentation Parameters

MAINTENANCE HISTORY DOCUMENTATION PARAMETERS				
PARAMETER	ML 1	ML 2	ML 3	ML 4
Maintenance Activities				
Repair / Adjustments	X	X	X	X
PM Activities	X	X	X	X
Equipment Problems	X	X	X	X
Failure Dates	X	X	X	X
Failure Root Cause	X	X	X	X
Inspection Results				
Inspection Date	X	X	X	X
SSC Condition	X	X	X	X

Basis: Documentation of the parameters listed in Table 9-1 above satisfies the requirements of LPR 230-07-00, Criteria 2, (Ref. 10.5) which states; "Maintenance activities, equipment problems, and inspection and test results are documented."

10.0 REFERENCES

The following references, and associated revisions, were used in the development of this document.

10.1 LIR 230-05-01.0, Operation and Maintenance Manual.

10.2 DOE O 430.1A, Attachment 2 "Contractor Requirements Document" (Paragraph 2, Sections A through C), a requirement of Appendix G of the UC Contract.

10.3 DOE Order 4330.4B, Maintenance Management Program, Section 3.4.9.

10.4 LIR 301-00-02.0, Variances and Exceptions to Laboratory Operation Requirements.

10.5 LPR 230-07-00, Maintenance History, Performance Criteria [2].

10.6 NFPA 17, 1998 Edition Standard for Dry Chemical Extinguishing Systems

11.0 APPENDICES

Appendix A: Monthly Inspection Checklist

Appendix A

Monthly Inspection Checklist

A monthly inspection shall be conducted in accordance with the manufacturer's listed installation and maintenance manual or owner's manual. At a minimum, the inspection shall include verification of the following:

- The extinguishing system is in its proper location.
- The manual actuators are unobstructed.
- The tamper indicators and seals are intact.
- The maintenance tag or certificate is in place.
- The system shows no physical damage or condition that might prevent operation (inspect all detectors, expellent gas containers, agent containers, releasing devices, piping, hose assemblies, nozzles, signals and auxiliary equipment).
- The pressure gauge(s), if provided, is in operable range.
- The nozzle blowoff caps, where provided, are intact and undamaged.
- Neither the protected equipment nor the hazard has been replaced, modified, or relocated.